The American Fertilizer

Vol. 99 OCTOBER 23, 1943 No. 9

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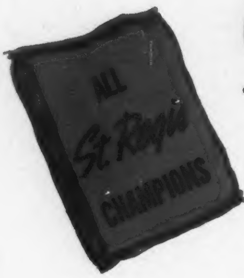

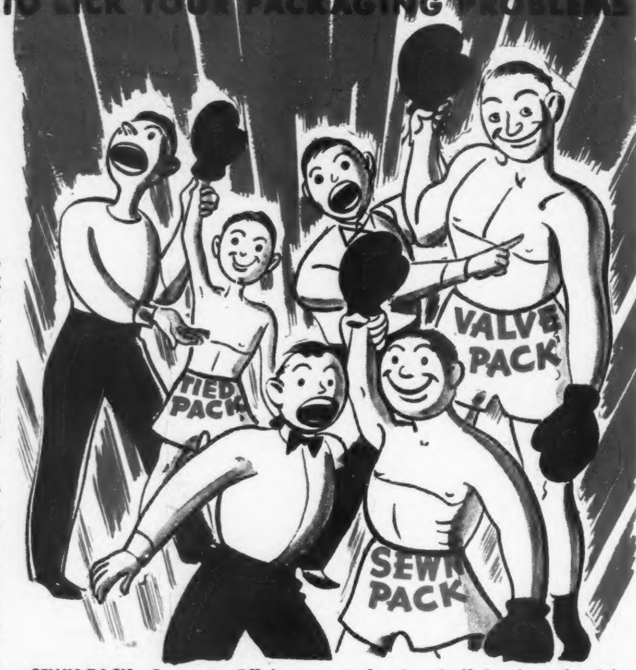

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...THE...
AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

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Potash for Citrus Crops in California*

By M. E. McCOLLAN, San Jose, California

THERE have always been differences of opinion about the effectiveness of potash in the fertilizer program for citrus trees in California. These different opinions undoubtedly have arisen from attempting to generalize about a situation which does not lend itself to generalization. The question of just the right make-up for a fertilizer recommendation will always be controversial when the answer is drawn from information too general in nature.

The citrus districts of California do not occur on large soil areas of the same chemical type and structural make-up. On the other hand, our citrus trees are planted on the widest possible range of soils from the physical standpoint, and fully as varied from the chemical standpoint. While it is true that the climatic factor has created a general soil need for organic matter and nitrogen, it is not surprising that other needs exist and that fertilizer recommendations of almost any kind, including most of the well known and lesser known plant-food elements, have produced favorable results at one place or another on this greatly varied soil cover.

Potassium or potash, as this element is more commonly called in fertilizer language, has been measured in California citrus soils and found to exhibit a wide range with extremes of 8 mg. of Neubauer potassium in the first foot on a Ramona sand to 44 mg. in the first foot on a Hanford sandy loam. The volume of soil testing thus far completed at least gives proof that soils in southern California exhibit a lower range of available potassium as well as a higher range.

These soil tests may or may not tell whether a citrus tree can get an optimum amount of potash from the soil. We know that on some soils of the Ramona series quite low in plant food the physical structure of the soil may restrict root development to such an extent that the tree may suffer at times from plant-food deficiencies. On some very gravelly and rocky types of citrus soil, the soil test may show a fairly good level of plant food, but it represents only that volume of soil between the rocks and gravel. As far as the writer knows this dilution factor is not taken into account when expressing the soil-test reading. It is conceivable that in such a soil a tree might actually become unprofitable because the volume of soil containing available plant food is smaller than we judge it to be.

On the other hand, citrus trees might be planted on a deep sandy soil of a low potash level, and the trees might be able to develop easily a tremendous root system and get enough potassium. This would be especially true if this sandy soil had a good "supplying power." If this "supplying power" were low, however, we would soon come to the point of poor trees and no profit.

In view of our soil variations, it does not seem surprising that many growers report satisfactory results from the use of potash on citrus groves in California. We have noted the range of readings for available potash in citrus soils. Aside from the fact that some of these soils give low potassium readings and therefore might be expected to respond to potash in the fertilizer program, there exists the possibility that physical characteristics of the soil may limit effective root development to a lesser soil mass, thereby also limiting the

*Reprinted from "Better Crops with Plant Food."

area from which available plant food can be drawn and making possible a response to potash.

During the past 10 years, potash applications have been made to large plots of citrus trees in various localities in southern California. In most cases, the trees selected had been supplied with ample nitrogen through the grower's own fertilizer program, but commercial forms of potash fertilizer had not been included. The check block of trees was, therefore, the grower's own program, which did not include potash. For comparison, the potash plot consisted of an equal number of trees to which potash had been applied in addition to the grower's own program. The potash applications featured relatively large amounts per tree (from 8 to 10 pounds sulphate of potash). This would mean approximately 750 to 1,000 pounds per acre. In a number of cases, the applications were continued for six years and then stopped, but subsequent records are still being taken. The potash was not applied broadcast, but was concentrated in two furrows along the tree rows.

Potash Tests on Lemons

On the Jester grove of Lisbon lemons on Placentia loam soil at Arlington, potash applications were started in 1933. The trees received a total of 48 pounds sulphate of potash per tree over a 5-year period. None has been applied since 1937. This soil showed a test for potassium which would be considered adequate, yet by creating a concentrated zone of available potassium in the soil by the furrow application, a favorable response to potash was evident from comparative data recorded.

During the five years when potash applications were being made, 13 pickings of lemons were recorded on each block of 48 trees, and the total increase on the potash plot during this period amounted to 103 field boxes. Apparently, however, the favorable effects of potash are cumulative, as eight pickings of lemons recorded since 1937 show a total increase on the potash plot during the period amounting to 203 field boxes.

The average leaf analysis for potassium on these plots for the years 1941–43 revealed that the leaves from the potash-treated trees averaged 37 per cent higher content of potassium than the leaves from the check trees.

A uniform planting of young Eureka lemon trees on the Hamilton grove at Goleta was selected for another test in 1933. Plots were 52 trees each, and the 52 trees in the potash block were given five pounds sulphate of potash per tree for a period of six years, after which the potash applications were discontinued.

During the early years of the test, yield differences were not apparent. In 1937, the yields for five pickings were—potash plot, 155 field boxes; check plot, 154½ field boxes. However, in 1939 the potash plot showed an increase of 18 boxes over the check plot, recorded in three pickings. In 1940, the difference became greater, and the potash yielded 41 more field boxes than the check plot. In 1942, a record was obtained on one picking which showed 30 more field boxes on the potash plot than on the check plot. The evidence here also seemed to bear out the observation that the favorable effects of potash are cumulative over a period of years. Leaf analysis in 1942 showed that the leaves on the potash-treated trees still contained 16 per cent more potassium than the leaves from check trees.

One of the most interesting tests from the standpoint of records obtained was on the Jameson lemon grove at Corona. Potash applications were given to 48 trees at the rate of eight pounds sulphate of potash per tree for six years. The potash was applied in the bottom of the irrigation furrows, along the tree rows. This soil is classified as Yolo gravelly loam (high fan phase) and by present standards has an adequate amount of available potash. Evidently, however, by making a concentrated application in furrows, the lemon trees were able to make use of the additional potash.

Potash Increases Fruit Count

Individual fruit counts were recorded on the 48 trees treated with potash and the 48 trees used as a check. These individual lemons were also graded in the packing house. This procedure was followed for 12 pickings from January 1937 to May 1939. Summarizing the record, we find that the potash treatment is credited with a total of 88,746 lemons and the check trees with 70,348 lemons, or a percentage increase of 26.1 per cent for the potash plot. Even though the yield on the potash plot was considerably greater, 58.7 per cent of the lemons were Sunkist grade while 56.5 per cent of the lemons from the check plot were Sunkist grade. It is rather inaccurate to try to transpose these individual lemon counts, without size information, to packed boxes of lemons, but using a 300-pack as a basis, it would mean roughly that the potash plot of 48 trees yielded 41 more packed boxes of Sunkist and 18 more of 2nd grade from the 12 pickings than the comparable check trees.

As the work with potash on fruit trees goes on, it appears that maximum response from this plant food is not secured the first year of application. It takes several years of potassium build-up before greatest benefit results. Even where heavy applications are made initially, this cumulative effect is apparent. True, there are instances where a favorable response can be measured during the season of application; but even in these cases, greatest benefit appears several years after potash applications are begun. Two potash tests on oranges in San Diego County illustrate this well.

On the Wohlford Valencia grove at Escondido, blocks of 48 trees with and without potash applications were studied. The potash was applied at the rate of 10 pounds sulphate of potash per tree, starting in 1939.

In 1940 and 1941, the field-box record was the same on each block of trees, but the record of packed boxes of Sunkist grade showed an increase in favor of the potash treatment of 15 boxes per acre in 1940 and 30 boxes per acre in 1941.

In 1942, a difference in yield of field boxes showed up, amounting to 66 more boxes per acre on the potash plot. Grading records showed in addition that the potash treatment resulted in 61 more packed boxes of Sunkist grade per acre than the check trees.

Average leaf analysis for the years 1941–42 shows that the potash-treated trees have 24 per cent more potash in the leaves than the check trees.

Test plots established on the Cunningham navel orange grove at El Cajon in 1939 showed no difference in yield until the 1942–43 season. However, during this period the potash block did show about a six per cent increase in packed boxes of Sunkist grade fruit.

In the 1942–43 crop, a large difference was obtained in the record of yields and grades from the two blocks. The potash-treated trees yielded 12.42 field boxes per tree and the check plot 10.60 field boxes per tree. Packed box records showed the following:

	Potash	Check
Sunkist packed boxes per tree	3.44	1.96
Red Ball packed boxes per tree	2.29	1.91
Total packed	6.73	3.87
Standards per tree	2.10	2.71
Discards, culls, etc., per tree	0.94	0.79
Per cent of field boxes picked packed as:		
Sunkist	27.74	18.51
Red Ball	18.46	18.31
Total per cent packed	46.20	36.82

The content of potassium in the leaves from these plots averaged for the years 1941–42 reveals that the potash-treated trees have 21 per cent more potassium in the leaves than the check trees.

Because of the interest which might attach to a study of quality factors closely related to those commonly considered in the commercial grading of citrus fruit, many thousands of measurements have been made on the fruit from the various test plots since 1938. These measurements taken on both potash and check plots were:

1. Comparative weight of 1,000 fruits of same ring size.
2. Comparative rind thickness measured at the stem end and side of 100 fruits of same ring size.
3. Comparative juice volume in duplicate samples of 100 fruits of same ring size.

Out of a total of 76 such tests 60 have shown more juice in the fruits from the potash plots. Heavier fruits were measured on the potash plots in 50 out of the 76 tests. A thinner rind was measured on the potash plots in 53 out of the 76 tests.

As a result of these measurements, it is reasonable to conclude that the potash treatments have caused a definite trend toward greater juice volume, heavier fruits, and a thinner rind in two-thirds of the number of tests.

Due to the extremely varied chemical and physical make-up of the soils upon which citrus crops are planted, it is only reasonable to expect that cases will be found where applications of potash are not necessary. This was the case in a number of the test plots, where the trees were already being adequately supplied by the soil. In other cases where the trees failed to respond to potash, there were other factors which needed correction before a potash response could be expected. In a few cases, potash test plots were carried on for only two or three years and then discontinued because it appeared that no response was being obtained. We know now that this was a mistake, since it may take several years on some soils for the potash to exert its full effect, after which marked differences can be measured on the potash-treated trees.

The outcome of these test plots thus far points to the fact that potash may be quite profitably used in the fertilizer programs on a number of the groves under test. It also emphasizes the desirability of re-appraising the need for potash in southern California citrus groves, heretofore considered by many as relatively unimportant.

New Ceiling on Superphosphate

AS PART of a governmental inter-agency program to encourage the production and distribution of superphosphate—a product urgently needed in the manufacture of fertilizer—the Office of Price Administration, on October 14th, set up prices for a new production area and for granulated triple superphosphate for domestic use.

Increased demand for superphosphate has resulted from heavy governmental purchases in addition to large domestic requirements for essential crop production.

So that there will be no delay in pricing pulverized superphosphate when production gets under way at a new plant whose construction has been authorized by the War Production Board, OPA established a ceiling at Joplin, Mo., as a new base-price producing point. The maximum price of 73 cents per unit of available phosphoric acid for sales of pulverized superphosphate run-of-the-pile, basis f. o. b. cars at Joplin, is in line with the present maximum price at Little Rock, Ark., the nearest producing point, in view of the freight differentials on Florida phosphate rock.

For sales of run-of-pile, basis f. o. b. cars at each producing point, the price specified for that point as listed below:

Point of production:	*Maximum price per unit of available phosphoric acid*
Little Rock, Ark.	$.70
Texarkana, Ark.	.70
Stege, Calif.	.84
Vernon, Calif.	.84
East Tampa, Fla.	.50
Jacksonville, Fla.	.53
Nichols, Fla.	.50
Pierce, Fla.	.50
Calumet City, Ill.	.68
Chicago Heights, Ill.	.68
East Saint Louis, Ill.	.63
Fort Wayne, Ind.	.68
Indianapolis, Ind.	.68
New Albany, Ind.	.65
Baltimore, Md.	.64
Lowell, Mass.	.75
North Weymouth, Mass.	.75
Woburn, Mass.	.75
Detroit, Mich.	.70
Lansing, Mich.	.70
Joplin, Mo.	.73
Carteret, N. J.	.69
Paulsboro, N. J.	.67
Buffalo, N. Y.	.70
Acme, N. C.	.62
Charlotte, N. C.	.62
Durham, N. C.	.62
Greensboro, N. C.	.62
Laurinburg, N. C.	.62
Navassa, N. C.	.59
Selma, N. C.	.62
Wadesboro, N. C.	.62
Wilmington, N. C.	.59
Wilson, N. C.	.62
Cincinnati, Ohio	.65
Cleveland, Ohio	.68
Columbus, Ohio	.68
Lockland, Ohio	.65
Sandusky, Ohio	.68
Silica, Ohio	.68
Toledo, Ohio	.68
Washington Court House, Ohio	.68
Philadelphia, Pa.	.67
Anderson, S. C.	.62
Charleston, S. C.	.55
Columbia, S. C.	.60
Greenville, S. C.	.62
Hartsville, S. C.	.62
Lancaster, S. C.	.62
Spartanburg, S. C.	.62
Dallas, Tex.	.70
Houston, Tex.	.68
Alexandria, Va.	.64
Lynchburg, Va.	.64
Norfolk, Va.	.63
Portsmouth, Va.	.63
Richmond, Va.	.64

OPA has also set a price on granulated superphosphate for domestic use in line with the previous ceiling which had been designed to cover the cost of sales to Lend-Lease. At the request of both producers and buyers, OPA has set a charge of $1.00 per short ton for the granulation of triple superphosphate for domestic use. The ceiling for sales of this product in bags to Government procurement agencies had previously been established at $1.00 per ton.

OPA also provided for an increase from 70 cents to 74 cents per unit of available phosphoric acid in the maximum price of bulk sales of triple superphosphate produced at Wales, Tenn. This adjustment allows for the increased cost of production at that point resulting from the necessity of using Florida rock instead of high-grade Tennessee rock, which no longer is available.

The current action is taken through Amendment No. 37 to Revised Supplementary Regulation 14 (Superphosphate), and became effective October 19, 1943.

The Use of Nitrogen Increases Grape Yields*

By RICHARD WELLINGTON and S. E. COLLISON, GENEVA

Both Sodium Nitrate and Ammonium Sulphate Prove Equally Effective—Equivalent of 32 Pounds of Nitrogen to the Acre Appears to Be Most Economical Rate

AS A RESULT of the five years' work it was found that an application of either 160 pounds of ammonium sulphate or 200 pounds of sodium nitrate, each equivalent to 32 pounds of nitrogen to the acre, increased grape yields approximately 1,400 pounds per acre. A second 32-pound increment of nitrogen gave an additional increase of about 300 pounds of grapes per acre. Choice of the nitrogen carrier and of the amount to be applied would therefore be determined by the cost of the actual nitrogen and the availability of the material.

The tests were started in 1938 and were continued for five years. A rundown Concord vineyard on Fremont and Marlin soils was used. The vines were 35 to 40 years old and the land had been in vineyard for the same length of time. Both the soils and vineyard are fairly representative of many vineyards to be found on the slopes around Lake Keuka. The elevation is about 600 feet above lake level and the land is fairly level. Each year of the tests the vineyard received two plowings and one horse hoeing.

The six fertilizer treatments used are shown in Table II. Four of them represented direct comparison between sodium nitrate and ammonium sulphate on two different levels. In the fifth treatment the sodium nitrate was increased to 600 pounds per acre and the sixth treatment consisted of 400 pounds of sodium nitrate plus 200 of muriate of potash. The plots contained 30 vines each and were separated by buffer rows. Eight blocks of six plots each were used and the treatments were placed at random within each block. Accordingly, each treatment was represented eight times. The yield of fruit from each plot was weighed separately.

Yields of Fruit

After the tests had been continued for three years, it was thought desirable to have a comparison between the plots of the experiment and others which would receive no nitrogen. Accordingly, in 1941, plots were marked out adjacent to the others and fertilizer withheld in 1941 and 1942. These plots had been getting 200 pounds of sodium nitrate per acre previous to 1941. Table I gives the yields per acre for these plots and also the average yields for two years of the other treatments.

Table II gives the six different treatments and the yields per acre for five years. The low yields in 1938 were due to various reasons. First, the rainfall was 4 inches below normal for the growing season. Further, the effect of the fertilizer would not be expected to influence the amount of fruit very much the first year. Observations during the season did show, however, that considerably more vine growth was being made. Rainfall was also deficient in 1941, and, in addition, frosts occurred on May 3 and 13 which froze back the new growth quite severely.

Comparing treatments made between the two sources of nitrogen it will be observed that differences in yield are quite small. By means of calculations which need not be gone into

(Continued on page 20)

*From "Farm Research," October, 1943.

TABLE II

THE EFFECT OF SODIUM NITRATE AT THREE NITROGEN LEVELS, AMMONIUM SULPHATE AT TWO NITROGEN LEVELS, AND SODIUM NITRATE PLUS POTASH ON GRAPE YIELDS FOR FIVE YEARS

Treatment	Pounds Per Acre	1938	1939	1940	1941	1942	4-year average*
		Yields in Pounds Per Acre					
Sodium nitrate	200	1,293	3,948	6,780	3,108	7,017	5,213
Ammonium sulphate	160	1,224	3,885	6,969	2,485	6,747	5,021
Sodium nitrate	400	1,365	4,365	7,743	2,988	7,050	5,536
Ammonium sulphate	320	1,410	4,416	7,227	2,874	7,002	5,379
Sodium nitrate	600	1,473	4,668	7,632	2,775	7,146	5,552
Sodium plus potash	400+200	1,470	3,888	8,217	2,961	7,542	5,652

*Excluding 1938 yields.

The Use of Ammonium Nitrate in Mixed Fertilizers

Division of Soil and Fertilizer Investigations, Bureau of Plant Industry, Soil, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Maryland

(Continued from the previous Issue)

Amount of Potash.—Ammonium nitrate and potassium chloride react in fertilizers to produce potassium nitrate and ammonium chloride. The products of the reaction are somewhat less hygroscopic than ammonium nitrate. It is to be expected, therefore. that additions of potassium chloride would affect the hygroscopicity of fertilizers containing ammonium nitrate. The influence of muriate of potash on moisture absorption was determined by varying the potash in a 5–10–x fertilizer from 0 to 20 per cent. All mixtures contained two units of nitrogen from ammonium nitrate and all potash was from high-grade muriate. The data are given in Table VI.

TABLE VI

THE INFLUENCE OF THE POTASH CONTENT OF 5–10–x FERTILIZER ON MOISTURE ABSORPTION[1]

Muriate of Potash Units	Moisture Content, per cent 59.4% R. H.	65.2% R. H.	72.5% R. H.
None	6.7	7.0	11.3
2	5.4	9.7	16.2
5	5.2	11.2	23.1
10	4.2	7.9	31.2
20	3.7	5.1	33.8

[1]Nitrogen from 1.25 units anhydrous ammonia, 2 units ammonium nitrate, and 1.75 units ammonium sulphate.

Increasing the quantity of potash reduced moisture absorption at 59.4 per cent relative humidity. At 65.2 per cent relative humidity 2 and 5 per cent potash increased moisture absorption but larger quantities reduced it. The 2 per cent potash is not enough to react with all the ammonium nitrate so the mixture should be more hygroscopic. The larger quantities make the ammonium nitrate-potassium chloride reaction go to completion, thereby eliminating certain salt pairs that absorb moisture at relative humidities of 50–60 per cent. Many of the salt mixtures resulting from the reactions absorb moisture at relative humidities of 67 to 71 per cent. As a result the high potash grades absorbed more moisture at 72.5 per cent relative humidity than did the lower potash grades.

Ammonium Nitrate-Superphosphate Bases. A series of nitrogen-superphosphate bases were prepared in which from two to eight units of nitrogen were from ammonium nitrate. In some bases it was used with ammonium sulphate. All mixtures contained 25 pounds of hydrated lime per 1000 pounds of superphosphate. The results of the moisture absorption studies are given in Table VII.

TABLE VII

THE INFLUENCE OF AMMONIUM NITRATE ON MOISTURE ABSORPTION BY NITROGEN-SUPERPHOSPHATE BASES

Source of Nitrogen, units Ammonium Nitrate	Ammonium Sulphate	Total	Moisture Content, per cent 59.4% R. H.	65.2% R. H.	72.5% R. H.
2	0	2	4.2	6.0	7.9
4	0	4	6.7	8.0	13.1
6	0	6	9.5	11.4	17.9
8	0	8	11.8	14.3	22.7
0	6	6	0.6	0.8	1.0
2	4	6	2.7	4.5	7.9
4	2	6	5.4	8.6	13.5

Increasing amounts of ammonium nitrate increased moisture absorption by the bases. The data indicate that a four per cent nitrogen base of satisfactory properties can be made from ammonium nitrate and a well neutralized superphosphate. If a higher nitrogen base is desired, the additional nitrogen should be derived from ammonium sulphate. In these bases, as well as in mixed fertilizers, the "condition" of the fertilizer was improved by including some ammonium sulphate in the mixture.

Discussion

The investigations presented in this report clearly show the influence of several important variables on moisture absorption by fertilizers at different relative humidities. The data include typical mixtures whose properties are rather well known by most manufacturers. Such mixtures can be considered as standards with which to compare fertilizers made by other formulas. If that procedure is carefully followed, the data should enable one to estimate rather accurately the hygroscopicity or

moisture absorption characteristics of fertilizers made by different formulas.

It is admittedly difficult to apply the results of this type of an investigation to the practical problems encountered in the factory and field. There are several reasons for this. In the first place, as far as is known, no real effort has been made to correlate the results of such investigations with the condition of fertilizers in the factory and on the farm. Such a study should be conducted under a cooperative arrangement between fertilizer manufacturers, farmers, and this or a similar laboratory. The Division is taking steps to initiate such an investigation during the current fertilizer season.

A second factor is the great variation in climatic conditions, primarily temperature and humidity, under which the "condition" of fertilizers is evaluated in the field. The degree of variation is partially indicated in an earlier report. A given formula may be satisfactory at one locality and unsatisfactory at another; likewise, it may be satisfactory during one season of the year but unsatisfactory at another.

A third reason that makes it difficult to evaluate quantitatively the data is the fact that the variations are gradual. Several of the tables in this report show that there is a relatively small difference in moisture absorption when a given source of nitrogen or potash is increased from 1 to 2 and 3 units. Since there is a gradual change in the product, it is virtually impossible to make recommendations that will be generally satisfactory and will still include the maximum permissible amounts of a material.

Finally, it should be recognized that only one property of a fertilizer, moisture absorption, is being evaluated. Other properties, such as particle size and kind and quantity of organic conditioner, materially influence the "condition" of a fertilizer.

Suggestions on the Use of Ammonium Nitrate

In view of the data given in this report and fertilizer trade experience, earlier suggestions (5) on the use of ammonium nitrate have been slightly modified. These revised suggestions are applicable to fertilizers containing 16 to 25 per cent total plant food, 2 to 6 per cent nitrogen and 4 to 10 per cent potash.

1. The fertilizer formula should include 25 to 50 pounds, depending on the material, of an active basic material per 1000 pounds of superphosphate in order to neutralize the superphosphate. Hydrated lime, powdered Cyanamid, ammonia, and cement flue dust are good materials for this purpose. Dolomite is not very reactive and should be based with superphosphate if used as the sole neutralizing agent.

2. In complete fertilizers formulated with superphosphate, ammonium sulphate and high-grade potash salts, use up to three units of nitrogen from ammonium nitrate. The ammonium nitrate can be derived from nitrogen solutions, solid ammonium nitrate, or a combination of these sources. If Nitrogen Solution-2A or 3 is used, it may be supplemented with about one unit of nitrogen from granular ammonium nitrate. On the other hand, if Nitrogen Solution-4 is used at the recommended rates of ammoniation, little if any additional ammonium nitrate can be used under average conditions.

3. In complete fertilizers formulated with superphosphate, Urea-Ammonia Liquor-B, ammonium sulphate, and high-grade potash salts, use up to two units of nitrogen from granular ammonium nitrate.

4. If the fertilizer contains two or more units of potash from manure salts, the combined quantity of ammonium nitrate and urea from solutions or solids should not exceed 50 to 75 pounds per ton. As far as possible manure salts should be used in alkaline (P-K) grades and low nitrogen-low potash mixtures.

5. Fertilizers containing ammonium nitrate and other hygroscopic materials should be formulated with as low a moisture content as possible. Avoid the use of wet dolomite, wet fillers, and conditioning agents of high moisture content.

6. If the fertilizer is shipped in moisture-proof bags, the indicated quantities of ammonium nitrate could be increased.

7. Ammonium nitrate can be based with superphosphate to make a 4 per cent nitrogen base. If desired, ammonium sulphate may be included to make a 6 per cent nitrogen base. The superphosphate should be well neutralized, as previously indicated.

8. Modify the foregoing rules in accordance with local conditions of temperature, humidity, conditions of storage and trade requirements. Moisture absorption difficulties are greater in the warm weather of summer and early fall than in the winter and spring season. Likewise, such difficulties are greater along the South Atlantic and Gulf Coasts than in the Northeast. On the other hand, trade requirements for first-class physical properties are more exacting in the Midwest and Northeast than in the South. All such factors must be carefully considered in formulating fertilizers with ammonium nitrate and other hygroscopic materials.

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A. A. WARE, EDITOR

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Principal Articles in This Issue

A Saving in High Analysis Fertilizer

The War Food Administration calls to the attention of farmers an important fact regarding their purchases of mixed fertilizers—that they can save money and at the same time contribute substantially to the war effort by buying higher analysis fertilizers.

WFA officials in charge of the fertilizer distribution program point out that higher analysis fertilizers will cost more per 100 pounds than those of lower plant-food content, but that the cost per pound of plant food is lower.

Using a comparison between a 5–10–5 mixed fertilizer and a 4–8–4 fertilizer as an example, WFA officials said that 4 bags of 5–10–5 will furnish 80 pounds of plant food (nitrogen, phosphoric acid and potash), whereas it would take 5 bags of 4–8–4 to supply the same number of pounds.

Fertilizer prices vary somewhat by states and areas, but in North Carolina—the nation's largest user of commercial fertilizer—a ton of 5–10–5 in 100-pound bags costs approximately $34.90, compared to about $30.40 for a ton of 4–8–4. On the basis of plant-food content, it would require 2,500 pounds of 4–8–4 to provide the same number of pounds of plant food contained in one ton of 5–10–5. Twenty-five hundred pounds of 4–8–4 costs about $38; comparing this cost to that of a ton of 5–10–5 at $34.90, the farmer has a saving of $3.10 by purchasing the high analysis grade.

Aside from the saving in cost, the farmer who uses higher analysis fertilizer will be helping to relieve transportation, packaging, and storing problems in connection with the manufacture and shipment of mixed fertilizer. The use of higher analysis fertilizer means that fewer bags will have to be used, and consequently fewer packages will have to be shipped over the nation's already overtaxed transportation system. The situation on materials for supplying bags requires that all measures be taken in the conservation of their use. Furthermore, fertilizer mixers' storage facilities are crowded, and use of higher analysis goods will ease this situation.

WFA officials also stressed that in order to help make the fertilizer distribution program fully effective, farmers should make application for mixed fertilizer as soon as possible and take delivery on it during the fall and winter months. This applies to fertilizer needed both this fall and next spring. Farmers apply to their local dealers for fertilizer.

Obituary

FRED H. BATEMAN

Fred H. Bateman, veteran farm machinery manufacturer and farmer, died at his home in Grenloch, N. J., on October 13. Mr. Bateman had spent his entire life in the farm machinery manufacturing business, succeeding his father and grandfather as head of the Bateman Company and in later years as manager of the Iron Age Division of A. B. Farquhar Company. His company has been an associate member of the Association for many years and he personally had served on the National Joint Committee on Fertilizer Application since its organization in 1925, as its chairman in 1942. At the annual meeting of the Joint Committee held on November 9, 1942, Mr. Bateman was honored by being presented with a scrapbook of letters from his friends as a recognition of his contribution to agriculture through the improvement of farm machinery and of his long service on the committee.

World Wheat Production Drops

The 1943 world's wheat production, excluding U. S. S. R. and China, is about 6 per cent smaller than in 1942, reports the Bureau of Agricultural Economics. While the U. S. has the second highest record supply of 1,453 million bushels, this is expected to be reduced to about 300 million bushels by July 1 of 1944. About 540 million bushels will be used as food, 390 million bushels as animal feed, 100 million bushels for alcohol, 80 million bushels for seed, and 50 million as exports. Importing wheat for feed, increased production, or reduction in its use as feed, may add to the possible carry-over next year.

Concannon Adviser to Chile on Chemicals

Charles C. Concannon, chief of the Chemical Unit of the Bureau of Foreign and Domestic Commerce has obtained a year's leave of absence from the Department of Commerce to act as consultant and adviser to the Chilean government on chemical matters. In his absence, T. W. Delahanty will serve as acting chief of the unit, and will also continue in his present capacity as chief of the Drugs and Pharmaceuticals Unit.

Mr. Concannon expects to spend about three months in Chile, and upon returning to the United States he will be located at the headquarters of the Corporation de Fomento do la Produccion of Chile, 120 Broadway, New York. Mr. Concannon's work with the Chilean government will be related to development of various branches of the chemical industry in that country. A part of his work will be to bring together American concerns interested in establishing operations in Chile and Chilean groups desiring to share in financial participation in mutual undertakings.

Bill to Uphold State Fertilizer Rights

Congressman J. Hart Peterson, of Florida, has introduced H. R. 3405, and a companion bill has been introduced into the Senate by Senator Andrews, requiring agencies of the United States Government who distribute seeds, livestock, livestock and poultry feed, nursery stock, fertilizer, or soil conditioning or fertilizer material to farmers to comply with and be subject to the inspection laws of the several States, with the exception that the provisions of the Act shall not apply to fertilizer manufactured and distributed by the Tennessee Valley Authority.

Link-Belt Electric Car Spotter Book Is Announced

Completion of a 16-page, illustrated Book 1992 on self-contained Electric Car Spotters is announced by Link-Belt Company.

The new book covers vertical-capstan units of 5,000 and 10,000 lbs. starting pull capacity, for mounting on a stationary foundation, or equipped with portable frame for convenient transfer from one location to another.

The electric motor can be integrally mounted on car spotter, or connected by flexible coupling and compactly mounted on a welded steel base common to motor and spotter.

Other uses enumerated, and illustrated, are pulling piles of lumber into and out of kilns; moving kier cars in textile mill; warping vessels along docks; launching and beaching flying boats; serving car-hearth furnaces; and dragging heavy loads along ground.

Horizontal-drum type car pullers for heavy duty service, and special capstans and anchor windlasses for marine service, are also shown.

A copy of new Book No. 1992 may be obtained by writing direct to Link-Belt Company, 2410 West 18th St., Chicago 8, Ill., or other office of the company.

Canadian Fertilizers

Changes for the 1944 Crop Season*

As an aid towards increasing food production, Canadian farmers used more fertilizer in the 1943 crop season than ever before, and as there is every prospect that the demand will continue to increase, arrangements have been made by the Fertilizer Administrator to have a still larger total tonnage of fertilizers available for the fall of 1943 and the spring of 1944.

In view of the prospects for this larger tonnage, and with the same total tonnage of mixed fertilizer containing potash, every farmer, the Administrator points out, should be reasonably sure of obtaining his fertilizer supply. With enough nitrogen and phosphates for the heavier soils, and a suitable range of potash in mixed fertilizers for such crops as potatoes, canning, and truck crops, there should be enough fertilizers of the satisfactory kind to meet the requirements of the food-production program for this fall and next spring.

It is estimated that there will be about 20 per cent more both of nitrogen and phosphates available. Nitrate of soda will be obtainable only on permit for very special needs in top-dressing certain vegetable crops, and it must not be used in fertilizer mixtures. However, a new form of free-flowing ammonium nitrate made in Canadian munition plants is now on the market. This material, containing 34 per cent nitrogen, will fill the requirements for much of the nitrogen.

Modifications of Analyses

As more potash is required in Britain next year, farmers in Canada and the United States will have to carry on with about 15 to 20 per cent less actual potash than they used in 1942–43, the reduction in the use of potash
The number of analyses of mixed fertilizers

*Reprinted from "The Fertiliser Journal," London, England.

being in the same proportions in both countries. To meet this change in supply, new fertilizer analyses are necessary.
has been reduced and the analyses themselves have been changed a little. For example, the popular 2–12–6 has been altered to 2–12–4 and the 4–8–10 to 4–8–8. Until more potash is available, it has been necessary to drop the 2–12–10 and the 0–12–10 from the approved list altogether. By these reductions, it is possible to save about 9,000 tons of K_2O, the amount which must be saved to meet the present situation. However, with this cut in the percentage of potash, there will still be about the same total tonnage of mixed fertilizers containing potash.

Potash only in Mixed Fertilizers

Farmers who wish to mix fertilizers on the farm can continue to do so, but they cannot use potash alone. The amount of potash fertilizer a farmer can now buy must not be more than enough to make one of the analyses of mixed fertilizers approved for 1943–44.

The grades fixed for the five Eastern Provinces for 1943–44 are: for general crops, 2–12–4; 4–8–8; 4–12–6; and 0–14–7. Because larger supplies of nitrogen and phosphates are arranged for, a 3–18–0 analysis has been added to the list for use on the heavier soils to help supply any increasing demand for fertilizer particularly on grain crops, that may develop.

For tobacco, three analyses may be manufactured. They are the 2–10–8 and the 3–10–8 for flue-cured tobacco; and the 5–8–7 for burley, pipe, and cigar leaf tobacco. As there is now more nitrogen arranged for than last year, the 3 per cent nitrogen analysis, as 3–10–8, has been added to the list. Because of the smaller tonnage of potash, the 2–12–10 analysis has been dropped. The 9–5–7 analysis that is usually available for tree fruits has been reduced to 9–5–5.

FERTILIZER MATERIALS MARKET

NEW YORK

Deliveries of Chemical Nitrogen Materials Continuing in Volume. More Potash Wanted but Present Production Will Not Warrant Added Sales. Demand for Phosphate Rock and Superphosphate Far in Excess of Supplies.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, October 19, 1943.

Sulphate of Ammonia

Deliveries continue in good volume against previous allocations with no change in the situation.

Nitrate of Soda

This material is moving steadily and with the agreement to allow 700,000 tons minimum to be imported into this country, subject to steamer space, it is believed that supply will continue to be ample to take care of all expected allocations.

Ammonium Nitrate

Deliveries are being made regularly and in good volume against previous allocations.

Potash

This material remains in good demand, with most buyers hopeful that additional allocations will be forthcoming. At the moment it is not certain that further quantities will be released, as all manufacturers seem to be about sold up and would hesitate to assume additional obligations at this time.

Phosphate Rock

Demand is especially heavy for Florida rock due to increased superphosphate program, which has resulted in firm price for new contracts. Miners all feel that there will be ample supply of phosphate rock but are curtailing larger contract obligations due to labor situation as they feel this situation may become more serious.

Superphosphate

Production is on the increase but demand is far in excess of supply. There is considerable demand for triple superphosphate for immediate shipment but practically no material is available as this material is nearly all being shipped against Lend-Lease at the present time. As previously indicated, considerable quantities should be released for the January–June period but there has been no release as yet.

BALTIMORE

Organics Going Entirely for Feed Purposes. No Changes in Chemical Material Prices. Fishing Season Ended with Small Supplies Remaining.

Exclusive Correspondence to "The American Fertilizer"

BALTIMORE, October 19, 1943.

There have not been any outstanding features in connection with the fertilizer business during the past few weeks.

Ammoniates.—The demand for organics for feeding purposes is unprecedented and considerably larger than the production. This practically eliminates tankage and blood as fertilizer ingredients on account of higher ceiling price prevailing on feeding material.

Castor Pomace.—Producers are well sold up with no offerings on the market at present at ceiling price of $2.90 ($3.52½ per unit N), f. o. b. producer's works.

Sulphate of Ammonia.—Allocations to manufacturers in the East have been on somewhat larger scale than heretofore, and beginning next month when allocated material arrives manufacturers will start preparing for next spring season's business. The market is unchanged, and there is no re-sale to be had.

Nitrate of Soda.—It is anticipated that the tonnage obtainable for the next spring season's business will, at least, be as large as last year, if not greater. The price on the domestic and the imported brands will also probably remain unchanged.

Superphosphate.—No large stocks are accumulating in the hands of manufacturers, and unless there is an easing up in the use of sulphuric acid for other purposes, there is not much change looked for in the East as compared with last year.

Fish Meal.—Fishing on the Chesapeake Bay has come to an abrupt end, at least 30 days prior to usual time, and stocks are at a minimum. Practically all fish scrap is going into feeding material on account of higher price available in that direction as compared with fertilizer.

Potash.—Nothing new in the situation, as producers are practically all sold up, and manufacturers have contracted for their approximated requirements.

Bone Meal.—This continues scarce. The situation may be relieved by arrivals of bones from South America, but, of course, everything depends on what further arrivals will be coming in over the balance of this year.

Bags.—There is still no change in the situation as far as restrictions against the use of new burlap bags for fertilizer are concerned, although in some sections the farm trade are making known to their senatorial and congressional representatives that they prefer their fertilizer shipped in burlap bags, having use for the empty bags for other purposes.

CHARLESTON

All Materials Scarce. Increased Ammonium Nitrate Production Expected. Offerings of Cottonseed Meal Limited.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, October 18, 1943.

Nitrogenous.—There have been no further offerings of nitrogenous tankage.

Castor Pomace.—This material continues scarce, with no offerings at OPA fixed price except to old customers and these will not be fully supplied.

Ammonium Nitrate.—The demand for September and October was above supply, but WPB hopes to bring into production additional quantities before the spring.

Dried Blood.—No change in this situation. Market is still $5.53 per unit of ammonia ($6.72 per unit N), f. o. b. Chicago, Ill.

Cottonseed Meal.—Prices on the 8 per cent grade are: Georgia, $49.50; South Carolina, $50.00. The output is mostly being taken by seed sellers and local dealers. Carload offerings remain very scarce.

CHICAGO

Buyers Ready to Take Any Fertilizer Organics at Ceiling Prices. Feed Demand Continues Active.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, October 18, 1943.

Lack of offerings of organics has been the rule so far this month, but it is possible more material will come to light by November. Buyers show no diminishing desire to take on any organic which may appear on the market at ceiling prices. This is indeed a far cry from previous seasons when much jockeying was done by both buyer and seller.

Ceiling on live hog prices temporarily reduced receipts, but receipts are now again about normal. Call for feed continues active.

Ceiling prices are well maintained. High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.38 ($6.54 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

PHILADELPHIA

Chemical Fertilizer Materials in Better Supply But Organics Going to Feed Trade Exclusively. Potash Sold Up.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, October 18, 1943.

The inorganic nitrogen supply seems to be in fairly good condition, under wartime conditions, but the organic materials still remain scarce. It is reported that potash may be a

little tight, although under allocation each user will probably secure a fair share of the available supply.

Ammoniates.—As mentioned above, the inorganic materials appear to be fairly plentiful, considering the unusual conditions prevailing, but the organic products are still those things one hears about but seldom sees. The imports of tankage, bone, blood, etc., are still going into other channels instead of to the fertilizer mixer, which is perhaps as it should be, but that does not make it any easier for the fertilizer manufacturer.

Sulphate of Ammonia.—Allocations are to be increased next month, according to reports.

Nitrate of Soda.—More liberal allocations have been made recently, and all mixers should get a good share.

Superphosphate.—Production proceeding at a good rate, and some increase has even been reported. Shipments moving out in regular, fair quantities.

Bone Meal.—It is rare, indeed, when a fertilizer mixer sees any of this material any more. Imports have been coming in, but they are used for manufacturing other products and for feeding.

Potash.—As already mentioned, this is not plentiful, but everyone should get his share of the supply under the allocation arrangements.

TENNESSEE PHOSPHATE

Pre-Winter Phosphate Activities in Full Swing. Labor Shortage Cuts Shipments to Below Grinding Capacity.

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, TENN., October 18, 1943.

All kinds of outdoor work in connection with phosphate operations is well under way, both in the mines and in new construction and repair work at the mills, also getting ready for the winter when work is minimized as much as possible. Shipping goes on at maximum speed to all consuming channels, with especially heavy demand from the farmers of Illinois, whose normal demand for phosphate for nearly forty years has always taxed shipping capacity during last of August, September and much of October. Now it is overwhelming, what with the increased acreage of soya beans, for which ground phosphate is the only perfect fertilizer, as well as the fact that AAA has extended to January 1st the deadline up to which in Illinois they pay users of rock phosphate $13.00 per ton in benefit payments.

So far as can be learned all sellers of ground phosphate rock have more orders than they can fill, not even being able at present to ship all they can grind on account of insufficient manpower to bag and load. Different reports give this manpower shortage as cutting down the bagging and loading capacity to from 40 to 65 per cent of the grinding capacity, which itself is well below the urgent demand from users.

It is assumed that all the manpower affecting agencies, WMC, Selective Service, USES, etc., are doing their best to carry out regulations as they interpret them, but as usual with bureau-administered functions, there is only open to them the letter of the law fixed to fit the average condition of the entire country. By the time exceptions can be secured for those above or below the average, the critical point is passed. The only solution appears to be to grant more discretionary power to local boards and also some use by local boards of the discretion now permitted.

Regardless of the various opinions entertained as to many of the expenditures of U. S. taxpayers' money by TVA in their "noble experiment" it is evident that their 40,000 demonstrations have been worth the entire cost of TVA by creating phosphate-consciousness everywhere.

THE USE OF NITROGEN INCREASES CROPS YIELDS

(Continued from page 9)

here, it can be shown that these differences are too small to have significance. We can say, therefore, with considerable confidence that, over a period of years, differences in yield produced by equivalent amounts of sodium nitrate and ammonium sulphate will probably be small.

How Much Nitrogen to Use

As shown in Table I, an application of 32 pounds of nitrogen—the amount in 200 pounds of sodium nitrate or 160 pounds of ammonium sulphate—gave an average increase of 1,395 pounds of grapes over the no-nitrogen treatment. In favorable years this increase might possibly be even greater.

TABLE I

THE EFFECT OF THREE NITROGEN LEVELS AND NITROGEN PLUS POTASH ON GRAPE YIELDS

	Yields in Pounds Per Acre			
Treatment Per Acre	1941	1942	Av. for 2 years	Av. for 4 years*
No nitrogen	1,584	5,304	3,444	——
32 lbs. nitrogen	2,796	6,882	4,839	5,117
Increase for 32 lbs.	1,212	1,578	1,395	——
64 lbs. nitrogen	2,931	7,026	4,978	5,457
Increase for 32 lbs.	135	144	139	340
96 lbs. nitrogen	2,775	7,146	4,960	5,552
Increase for 32 lbs.	—156†	120	—18†	95
64 lbs. nitrogen; 100 lbs. potassium	2,961	7,542	5,251	5,652
Increase for 100 lbs. potassium	30	516	273	195

*Treatment not used 1939, 1940. †Decrease.

A further but much smaller increase is given when the 32-pound application is increased to 64 pounds. Where the 600-pound sodium nitrate (96 pounds actual nitrogen) application was used, the results are inconclusive; a small increase being shown in 1942 and a decrease in 1941.

The use of 200 pounds of muriate of potash annually with 400 pounds of sodium nitrate also shows an appreciable increase in yield over the treatment consisting only of 64 pounds of nitrogen. This increase amounted to 516 pounds in 1942.

In these tests, however, the greatest returns in yields were obtained from the use of nitrogen. Where soils have been depleted of much of their fertility and vine growth is rather weak, the addition of nitrogen would probably give good returns. For best results such soils should be at least fairly well drained and protected from erosion.

A few years ago only one-third of the Finger Lakes grape growers were using commercial nitrogen. With the return of normal times it would seem that, with reasonable prices for grapes, more growers could use some nitrogen, either as sodium nitrate or ammonium sulphate, with profit.

Nitrogen Aids Utah Wheat

Increases of more than ¼ bushel of winter wheat for each pound of nitrogen applied broadcast in early spring were obtained in Cache County, Utah, on dry land farms in 1942–43 tests reported by Prof. Howard B. Peterson, Utah Experiment Station. Increases were in proportion to the amount of nitrogen applied; 40 pounds of nitrogen in the form of ammonium sulphate giving an increase of 12.6 bushels, while 40 pounds of nitrogen from sodium nitrate gave an increase of 17.4 bushels, or in each case a return of about $3.00 for each dollar's worth of fertilizer applied.

Soldiers of the Soil

A Review by Ruth Miller

Soldiers of the Soil, original screen play by William S. Dutton and Maxwell Shane; directed by William Berke; produced by Pine-Thomas.

John Landis	Russell Hayden
David Landis	Carroll Nye
Samuel Landis	Irving Bacon
Mother	Fay Helm
Richard Landis	Grant Withers
Grace Landis	Mady Correll

Out of the crisis facing the farmers in wartime has come an honest and deeply moving film, "Soldiers of the Soil," produced by Pine-Thomas Productions of Hollywood in collaboration with E. I. du Pont de Nemours & Company. Fundamental in its appeal, the film has caught the promise of the rich earth and the trouble in the hearts of those who fight, not on any Second Front, but on that battle line without which all others must fail, the Food Front.

"Soldiers of the Soil" has dignity and power. It has the beauty of broad fields and living creatures and growing things. It owes this dignity to a straightforward presentation of the farmer as an intelligent citizen who knows his job. It derives its power from the fact that the problem facing plain Americans on the land in an ever more difficult world is allowed to state itself simply and directly. The farm boy, who must choose between beating drums and the excitement of war and the prosaic day-by-day job which provides the sinews of war but is one without uniforms, medals or glory, has his counterpart in every farmhouse in this country.

The picture makes it clear that farming requires more than patriotic fervor and good intentions. It demands a man with understanding of the land. He must have skill and broad knowledge. He must be ever alert to new discoveries and developments in agriculture. He must have the initiative to take advantage of new methods and processes; to grasp and use the tools which chemical science and industrial progress have made available to him. He must be able to plan and execute as well as work with his hands.

The film shows how long a way the modern farm has come since the days of kerosene lamps and pails of water which had to be tugged from the nearby spring. Today, chemicals protect the seed from disease and rot, restore the soil and increase the yield. They safeguard the livestock and take the hazards out of husbandry. In 1943, machinery and electric power do the work of ten men in the field and five women in the farmhouse itself. But it takes skill and know-how to maintain and run farm machinery and to use the chemicals to produce more and finer food to feed the millions of the world. Farming is no longer a task for the willing drudge. It is a many-sided business. It calls for an experience and aptitude as peculiarly its own as any profession or trade. And above all it demands a man with a genius for growing things.

Such a man was young John Landis in "Soldiers of the Soil." But like many another, he felt that what he was doing was not enough. He wanted to be in uniform. He shrank from the questions in the eyes of his neighbors and friends whose sons and brothers were in the South Pacific, in the Aleutians, in Italy, in all the strange countries of the world. For a young, strong man with energy and spirit, fighting would be easy. The hard part was to stay with his fruitful acres and, by using all his knowledge and skill and every device and aid men of science could give him, to keep these acres at an all-out peak of production. How he made his decision is the story of the film.

A returned soldier-brother whose fighting days are over helps John to his decision. In a well-handled sequence, the blind brother, David, tells how great and vital is the part the farmer must play in the war; how without him there can be no hope of victory or of peace or the rehabilitation of the peoples ravaged by this holocaust set loose by greed and aggression.

The film owes much to the expert writing of William S. Dutton and Maxwell Shane. The characters are well conceived and developed. The dialogue has verity and simple directness with no high flown phrases or bombast to jar the sensitive ear.

The du Pont Company has sacrificed and

subordinated its practical interests in order to emphasize the theme of this outstanding industrial picture, the truth that among the greatest of our soldiers are the unsung "Soldiers of the Soil."

In the role of the returned soldier-brother, Carroll Nye portrays one of war's casualties with sensitiveness and restraint—a man who has lost his sight only to learn to see with the heart, to see with understanding and wisdom, without self-pity, and to see life whole.

Russell Hayden, as the young man torn between leaving his farm to uncertain and inadequate care and what he believes to be his duty to his country, is forthright and honest. As the mother, who has seen the farm bring death to one beloved child and little in worldly goods to either her family or herself, Fay Helm gives an excellent account of herself. Irving Bacon makes a satisfactory father and Grant Withers and Mady Correll are very good in supporting roles. The children, played by Edith Fellows and Teddy Infur, are particularly enchanting.

But the greatest "player" in the cast is the farm itself, eternally serene and full of that deep peace that belongs only to that strip of earth, warmed by the sun in summer and wrapped in the snow in winter, that has been cherished and tended and loved by man through time.

Fertilizer Consumption

North Carolina

North Carolina farmers used 1,292,655 tons of fertilizer during the 1942–43 farming season as compared with 1,194,175 for the previous year and 1,113,327 in 1940–41, according to fertilizer sales tags compiled in the office of A. R. Powledge, auditor for the State Department of Agriculture.

According to the statistics division of the Department, Robeson County led the State last year, using 42,700 tons, with Johnston second at 40,900 tons. Third in the list was Sampson County with 33,000 tons and Pitt was fourth, using 31,200.

South Carolina

A summary of fertilizer sales in South Carolina by grades for the fiscal year July 1, 1942 to June 30, 1943, has been prepared by the Fertilizer Department of Clemson College. Sales amounted to 521,094 tons of mixed goods, 272,776 tons of materials, 4,118 tons of customers' mixtures—total 797,988 tons. The ten leading grades included 95 per cent of the mixed goods tonnage. They were: 3–9–6, 206,621 tons; 2–12–6, 79,776 tons; 4–8–6, 70,899 tons; 3–8–5, 42,168 tons; 4–8–4, 33,811 tons; 3–9–9, 25,565 tons; 4–8–8, 13,647 tons; 3–12–6, 11,041 tons; 5–7–5, 7,171 tons; and 0–12–12, 6,899 tons. The leading materials were: sodium nitrate, 126,019 tons; potash salts, 101,409 tons; and superphosphate, 24,658 tons.

Massachusetts

According to Philip Smith, head of the Fertilizer Control Service in Massachusetts, sales of fertilizer during the fiscal year July, 1, 1942 to June 30, 1943 totaled 77,804 tons, as compared to 70,580 tons sold during the calendar year 1942. The leading grades, according to rank, were: 4–9–7, 16,084 tons; 4–10–10, 15,477 tons; 3–8–7, 11,128 tons; 6–3–6, 5,966 tons; 3–12–6, 3,769 tons; 6–15–15, 2,693 tons; and 4–12–4, 2,551 tons. Total sales included 62,989 tons of mixed fertilizers and 14,815 tons of materials.

WFA Urges Continuation of Sales of Potash Materials

Because of the desire on the part of some fertilizer manufacturers to use as much potash as possible in their mixed goods, there has been a tendency to discourage the sale of potash materials to the farmer for direct application or as an ingredient in home mixtures. In a letter to fertilizer manufacturers, M. K. Derrick, Chief of the Fertilizer Division, WFA, urges that sales of such materials be continued during the coming season. His letter states:

"Knowing the potash situation, we are loathe to take steps toward regulatory measures which would compel manufacturers to sell potash as a straight material. We and you alike, however, must recognize the legitimate claim of the farmer who has historically

See Page 4

purchased straight potash-bearing materials. All manufacturers appreciate, we are sure, that had they not sold straight potash materials in the base period their allocation would most certainly be correspondingly less; since if they had not had the demand they would obviously not have purchased as much potash.

"We are not suggesting that the requirements of a farmer for straight potash materials be provided in full. On the contrary, he is entitled to no more than his pro-rata share of the quantity allocated to you. Your allocation is equivalent to approximately 81 per cent of the quantity purchased by yourselves, averaged on the basis of the past two years. Is it not to your interest to offer a similar average of the past two seasons' purchases to the buyer of straight potash materials? When allocations for period III are made, you can supplement your allotment to the buyer proportionately. If this is done many complaints will be avoided, and the wholehearted cooperation of industry will obviate the necessity for any administrative action here."

Record Fertilizer Production Predicted for 1944

The War Food Administration is urging farmers to make immediate application for mixed fertilizers that will be needed either this fall or next spring and to accept delivery during the fall and winter months. WFA officials state that "Because of transportation, labor, and storage difficulties it is necessary to keep mixed fertilizer moving if manufacturers are to meet farmers' needs." They also state that "It is expected that between 10 and 12 per cent more chemical fertilizers will be available to farmers in the 1943–44 crop season than during the past season when farmers used a record 10,500,000 tons." It is therefore not a question of scarcity but merely an effort "to avoid peak labor loads in the fertilizer plants, to prevent overloading of transportation facilities, and to relieve the storage situation."

No one can predict very accurately how large the demand for fertilizer may be this coming season, but all informed persons agree that it will be the heaviest in our history. For this reason the farmer who orders his fertilizer early and accepts delivery early will not only be sure of getting what he wants and having it on hand when the time comes to use it, but he will also be making a distinct contribution to the war effort by making it possible for fertilizer plants to operate in an orderly manner under many difficulties.

A recent summary of the fertilizer situation by The National Fertilizer Association based on official information indicates that there will be sufficient nitrogen to meet all demands both for mixed fertilizers and for side and top dressing. The increase will be mainly in the form of ammonia and ammonium nitrate. All of the ammonia and some of the ammonium nitrate will be used in mixed fertilizers. More of the ammonium nitrate, a substantial quantity of nitrate of soda, both synthetic and Chilean, and, in some areas, cyanamid and cal-nitro will be available for side and top dressing. It is safe to predict that more commercial nitrogen will be used by American farmers in 1943–44 than in any previous fertilizer year.

A new record in production and use of superphosphate will also be attained during the coming year, even with labor shortages and transportation difficulties which are unavoidable in wartime.

Potash production is at an all-time peak, but due to a heavier demand for potash for industrial and chemical uses and to the allocation of about 10 per cent of our total production to Great Britain and Canada, the supply of potash for use as fertilizer will be somewhat less than the quantity used in 1942–43. While the shortage should not be serious, conservative and well-planned utilization will be necessary.

The tonnage of mixed fertilizer that will be produced and sold in 1943–44 will undoubtedly set a new record. The consumption of all fertilizers in calendar year 1942 was just over 10 million tons and it would now appear that consumption in 1943 may reach 11 million tons. Five years ago, 1938, total consumption was 7,548,000 tons, hence any talk about shortage of any kind of fertilizer must refer to a shortage as related to wartime demand and not to a shortage as related to past use.

The Office of Price Administration will establish, in the near future, a dollars-and-cents ceiling price for each grade of fertilizer that may be sold in each state, to replace present maximum prices which were established in the spring of 1942 by the "freezing" method and which were later increased slightly in some territories. However, the new maximum prices are not expected to vary much from those now in effect and farmers may, therefore, be assured that fertilizer prices will be about as reasonable this fall and next spring as they have been in the past.

BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Textile Bag Mfrs. Association, Chicago, Ill.

BAGS—Paper
Bagpak, Inc., New York City
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Union Bag & Paper Corporation, New York City.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

BAG CLOSING MACHINES
Bagpak Inc., New York City.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City

CONTACT ACID PLANTS
Chemical Construction Corp., New York City

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Company, New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Company, Columbus, Ohio.
International Minerals and Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind

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